

SOLAR PHYSICS

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# SOLAR PHYSICS

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- BISNOVATY-KOGAN, G. S. and I. M. GORDON: 'The Acceleration of the Solar Wind and the Heating of the Coronal Plasma above Active Regions', *Astrophys. Letters* **4** (1969), 149. (J.-C. HENOUX)
- BURLAGA, L. F. and K. W. OGILVIE: 'Causes of Sudden Commencements and Sudden Impulses', *J. Geophys. Res.* **74** (1969), 2815. (L. D. DE FEITER)
- BURGESS, A. and H. P. SUMMERS: 'The Effects of Electron and Radiation Density on Dielectronic Recombination', *Astrophys. J.* **157** (1969), 1007. (JAY M. PASACHOFF)
- BRUNER, E. C., JR., and W. A. RENSE: 'Rocket Observations of Profiles of Solar Ultraviolet Emission Lines', *Astrophys. J.* **157** (1969), 417. (JAY M. PASACHOFF)
- CANFIELD, R. C.: 'Reversals of Selected C $\eta$  Solar Lines', *Astrophys. J.* **157** (1969), 425. (JAY M. PASACHOFF)
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- EGIDI, A., G. PIZZELLA, and C. SIGNORINI: 'Measurements of the Solar Wind Direction with the IMPI Satellite', *J. Geophys. Res.* **74** (1969), 2807. (L. D. DE FEITER)
- FEIX, G.: 'A Contribution to the Model of the Slowly Varying Component of the Sun Derived from Observations at 8.6 mm', *Astrophys. J.* **157** (1969), 903. (JAY M. PASACHOFF)
- FORBUSH, S. E.: 'Variation with a Period of Two Solar Cycles in the Cosmic-Ray Diurnal Anisotropy and the Superposed Variations Correlated with Magnetic Activity', *J. Geophys. Res.* **74** (1969), 3451. (L. D. DE FEITER)
- FREDRICKS, R. W.: 'Electrostatic Heating of the Solar Wind Ions beyond 0.1 AU', *J. Geophys. Res.* **74** (1969), 2919. (L. D. DE FEITER)
- GOPASYUK, S. I., N. N. ERUSHEV, and YU. I. NESHPOR: 'On the Role of the Compression and Expansion of the Generation Region in Synchrotron Radioemission', *Izv. Krimsk. Astrofiz. Obs.* **39** (1969), 299. (N. N. STEPANYAN)
- HALL, L. A., J. E. HIGGINS, C. W. CHAGNON, and H. E. HINTEREGGER: 'Solar Cycle Variation of Extreme Ultraviolet Radiation', *J. Geophys. Res.* **74** (1969), 4181. (L. D. DE FEITER)
- HALL, D. R. B. and R. W. NOYES: 'Observation of Hydrogen Fluoride in Sunspots and the Determination of the Solar Fluorine Abundance', *Astrophys. Letters* **4** (1969), 143. (J.-C. HENOUX)
- HUDSON, H. S., L. E. PETERSON, and D. A. SCHWARTZ: 'The Hard Solar X-Ray Spectrum Observatory', *Astrophys. J.* **157** (1969), 389. (JAY M. PASACHOFF)
- HUMMER, D. G.: 'Spectral Line Formation by Non Coherent Scattering with a Dipole Phase Function', *Astrophys. Letters* **5** (1969), 1-4. (J.-C. HENOUX)
- HUNDHAUSEN, A. J. and R. A. GENTRY: 'Numerical Simulation of Flare-Generated Disturbances in the Solar Wind', *J. Geophys. Res.* **74** (1969), 2908. (L. D. DE FEITER)
- JAKOVKIN, N. A. and M. Y. ZELDINA: 'The Yellow Line of Helium in Prominences', *Soln. Dann.* **4** (1969), 82. (G. Y. VASSILYEVA)
- KUROKAWA, H., S. TOMINAGA, J. KUBOTA, and I. KAWAGUCHI: 'The Flash Spectrum Observed at the Total Solar Eclipse of February 5, 1962', *Publ. Astron. Soc. Japan* **21** (1969), 141. (Y. UCHIDA)
- LANZEROTTI, L. J.: 'Low-Energy Solar Protons and Alphas as Probes of the Interplanetary Medium: The May 28, 1967 Solar Event', *J. Geophys. Res.* **74** (1969), 2851. (L. D. DE FEITER)
- MITCHELL, W. E., Jr. and O. C. MOHLER: 'Revision of the Ultraviolet Solar Spectrum 3650-3000 Å', *Astrophys. J. Suppl.* (1969), No. 165. (JAY M. PASACHOFF)
- MIZUNO, S. and M. NISHIDA: 'On the Structure of the Outer Solar Convection Zone', *Publ. Astron. Soc. Japan* **21** (1969), 121. (Y. UCHIDA)
- MOISEEV, I. G., L. I. YUROVSKAYA, and YU. F. YUROVSKY: 'Catalogue of Unusual Phenomena in the Solar Radioemission at a Frequency of 208 MHz during IGY and IQSY', *Izv. Krimsk. Obs.* **39** (1969), 325. (N. STEPANYAN)
- RAMATY, R.: 'On the Nature of the High-Frequency Cutoffs of Type IV Solar Radio Bursts', *Astrophys. Letters* **4** (1969), 43. (J. -C. HENOUX)
- SCHOLZ, G.: 'Untersuchungen über die Struktur der Sonnenkorona aus photographischen Polarisationsmessungen während der totalen Sonnenbedeckung am 15.2.1961', *Astron. Nachrichten* **291** (1969), 187. (E. A. GUSSMANN)
- SCHOLZ, G.: 'Polarimetrische Untersuchungen an einem diffusen Koronastrahl und die Form

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